

Appl. No. 09/964,910
Reply to Office Action of August 27, 2003

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-7 (canceled)

Claim 8 (currently amended): A gas diffusion electrode operable within a fuel cell comprising a fibrous carbonaceous material, wherein the gas diffusion electrode comprises a thickness of about 5 μ m or less.

Claim 9 (canceled)

Claim 10 (previously presented): The gas diffusion electrode as claimed in claim 8, wherein the fibrous carbonaceous material comprises carbon nanotubes.

Claim 11 (previously presented): The gas diffusion electrode as claimed in claim 8, wherein the fibrous carbonaceous material comprises vapor-grown carbon fibers.

Claim 12 (previously presented): The gas diffusion electrode as claimed in claim 8, wherein the fibrous carbonaceous material comprises a mixture of carbon nanotubes and vapor-grown carbon fibers.

Claim 13 (previously presented): The gas diffusion electrode as claimed in claim 12, wherein the mixture includes a ratio of carbon nanotubes to vapor-grown carbon fibers that ranges from about 0:1 to about 9:1.

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Claim 14 (currently amended): A fuel cell, comprising:
a first electrode and a second electrode facing the first electrode; and
a proton conductor disposed between the first electrode and the second electrode, wherein
at least one of the first electrode and the second electrode comprises a fibrous carbonaceous
material formed on the proton conductor, and wherein at least one of the first electrode and the
second electrode comprises a thickness of about 5 μ m or less.

Claim 15 (cancelled)

Claim 16 (previously presented): The fuel cell as claimed in claim 14, wherein the
fibrous carbonaceous material is selected from the group consisting of carbon nanotubes, vapor-
grown carbon fibers and mixtures thereof.

Claim 17 (previously presented): The fuel cell as claimed in claim 16, wherein the
fibrous carbonaceous material comprises a catalyst material in an amount of about 20% by
weight or less.

Claim 18 (previously presented): The fuel cell as claimed in claim 17, wherein the
catalyst material is selected from the group consisting of platinum and alloys thereof.

Claim 19 (previously presented): The fuel cell as claimed in claim 18, wherein the
mixture includes a ratio of carbon nanotubes to vapor-grown carbon fibers that ranges from
about 0:1 to about 9:1.

Claim 20 (previously presented): The fuel cell as claimed in claim 14, wherein the first
electrode comprises a fuel electrode and the second electrode comprises an oxygen electrode.

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Claim 21 (currently amended): A fuel cell, comprising:

a first electrode, a second electrode, and a proton conductor disposed between the first electrode and the second electrode, wherein at least one of the first electrode and the second electrode comprises a carbonaceous material selected from the group consisting of at least one type of carbon nanotube, a graphite fibrous material, and mixtures thereof, and wherein at least one of the first electrode and the second electrode comprises a thickness of about 5 μ m or less.

Claim 22 (previously presented): The fuel cell as claimed in claim 21, wherein the carbonaceous material consists essentially of a mixture of the at least one type of carbon nanotube and a graphite fibrous material.

Claim 23 (previously presented): The fuel cell as claimed in claim 22, wherein the graphite fibrous material includes a vapor-grown carbon fiber.

Claim 24 (previously presented): The fuel cell as claimed in claim 23, wherein the mixture includes a ratio of the at least one type of carbon nanotube to the vapor-grown carbon fiber that ranges from about 0:1 to about 9:1.

Claim 25 (previously presented): The fuel cell as claimed in claim 23, wherein the mixture includes a ratio of the at least one type of carbon nanotube to the vapor-grown carbon fiber that ranges from about 1:1 to about 4:1.

Claim 26 (previously presented): The fuel cell as claimed in claim 22, wherein the carbonaceous material contains a catalyst material in an amount of about 20% by weight or less.

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Claim 27 (withdrawn): A method of producing a fuel cell, the method comprising the steps of:

providing a proton conductor, a first electrode and a second electrode, wherein at least one of the first electrode and second electrode comprises a fibrous carbonaceous material; and

forming the first electrode and the second electrode on the proton conductor such that the proton conductor is disposed between the first electrode and the second electrode.

Claim 28 (withdrawn): The method as claimed in claim 27, wherein the step of forming includes spraying the fibrous carbonaceous material on the proton conductor.

Claim 29 (withdrawn): The method as claimed in claim 27, wherein the step of forming includes dripping the fibrous carbonaceous material onto the proton conductor.

Claim 30 (withdrawn): The method as claimed in claim 27, wherein the fibrous carbonaceous material is selected from the group consisting of at least one type of carbon nanotube, a graphite fibrous material and mixtures thereof.

Claim 31 (withdrawn): The method as claimed in claim 30, wherein a ratio of the at least one type of carbon nanotube to the graphite fibrous material in the carbonaceous material ranges from about 0:1 to about 9:1.

Claim 32 (withdrawn): The method as claimed in claim 31, wherein the carbonaceous material includes a metal component having a catalytic activity in an amount of about 20% by weight or less.